Automated Car Service Management System to Make Industry More Efficient

GMIP Aponsu[1], WAAM Wanniarachchi[1] and GIF de Silva[1]

[1]*Department of Information Technology, Faculty of Computing, General Sir John Kotelawala Defence University,Ratmalana,Sri Lanka*

#36-is-0008@kdu.ac.lk

Abstract*:The automobile maintenance and service industry is also witnessing the trend of people expecting to order online like other consumer goods and services these days. But it is a weakness that many leading vehicle maintenance service providers are still doing business based on paper works. Because of this, it appears that there is a minimum level of trust and willingness of the customers regarding the existing efficiency of the automobile maintenance and services sector. Due to this, the customers should spend their time and effort in vain, while the opportunity for the organizations to use their time and resources efficiently is also reduced. In the existing manual system, the ability to provide the necessary information to the customer immediately and to provide the most accurate information has been reduced. As an alternative to that, automating the existing manual system provides the space for organizations to successfully face a large customer attraction and business competitiveness. This automation provides an opportunity for customers to book an appointment and get services without the hassle that they expect and pay online, as well as get information about services and prices from home. This allows the organization to increase sales and avoid unnecessary labor losses due to the ability to offer discounts to frequent customers and carry out corporate marketing campaigns to attract customers. The purpose of this study is to limit the mistakes and wastages of not only consumers but also the automobile service industry by automating the existing manual systems.*

Keywords: *Automobile, Web-based System, Automate, Online booking, Reporting.*

1. Introduction

Vehicle production goes back many years. Vehicle service and maintenance companies have also been established and maintained since that time. From time immemorial, vehicle maintenance and service companies have maintained their transactions and related data in books and ledgers. Therefore, the main problem that arises is the loss of vital data for the customer as well as the organization due to the misplacement or destruction of the ledgers, transaction books, and data. Other disadvantages are that the organization must manually write and embed all the data, missing data, making it difficult to find the information, as well as costing considerable time and money. Vehicle maintenance and service companies are always busy workplaces and the need for automated vehicle maintenance and service system instead of a traditional written data entry system has arisen.

The problem now is that there is no system in place to make a reservation for the service before purchasing a customer service through the existing manual system. It is a vulnerability in current systems. Customers have to wait in long queues, waiting for one customer to serve causes wasting customer time and customer money. One of the weaknesses of the current system is the lack of a systematic system for the customer to obtain accurate data on previous maintenance and spare parts used for their vehicle.

 The main purpose of this research is to get rid of traditional transaction reporting and traditional service supplying methods and provide a formal theoretical and more accurate solution to satisfy the consumers who grant the services as well as organizations that provide services in a more convenient and efficient manner.

2. Literature Review

The strength of both technology and financial status is providing individuals wings to not only realize but also to fulfill their aspirations as we move toward a period when technology will predominate, and as the financial status will also rise through time. Shortly, there will be more automobiles, which will result in more cars needing repairs at mechanic shops. This will result in lines at the mechanic shop. The issue of long lines and waiting may become quite significant in the future. Development in the realm of service centers and garages is the Online Management System for Automobile Services. Any automobile owner will feel very convenient if they can use a website to find and contact the garages or service shops in their area. With the click of a button.(S. B. Hanamant, B. Dharmendra and P. Yash, 2018)

The Web will generally serve as the basis for numerous advancements. As we near an era when invention will be the driving force, the power of innovation is giving people wings so they may not only innovate but also meet all of their needs immediately. As India's population of vehicles grows, so will the quantity of vehicles waiting to be repaired at technician shops. The current situation will influence a chain at the repair shop. The problem of lengthy waits and queues can become quite significant eventually.

In the sphere of administrative centers and carports, the Vehicle Service System for Automobile Services represents a reformist development. Any vehicle client can use this website to locate local help centers or carports, contact them, and reserve an available slot with the selection of the necessary services. After making a reservation, the client will unquestionably be aware of the amount charged and the amount of time required for adjustments. Customers will also have access to a FAQs section to aid them with any questions. (Vigyani Singh, 2021)

The number of countries that produce cars has increased from a small number to a large number. While it has been largely consistent in other regions, the number of motor vehicles produced in the Asia and Pacific region has increased significantly over time. By the end of 2018, the Asia and Pacific area produced close to 52 million vehicles or around 55% of all vehicles produced worldwide. In 2018, China, the United States, Japan, India, and Germany were the top five automakers. Production rose by 26 and 33 percent, respectively, in China and India, following the regional trends mentioned above. With growth rates of just 2% and 1%, respectively, in the US and Japan. In Germany, the number of vehicles produced fell by 10%.

From more than 80 million units in 2010 to more than 100 million units in 2018, sales of all sorts of new automobiles, including used vehicles Following North America, where sales climbed by 30% from 20 million units in 2010 to 26 million units in 2018, is the region of Asia and the Pacific and the Arab States, where sales increased by 60% from 25 million units in 2010 to 47 million units in 2018. Sales climbed by 10% in the European Union (EU), from 19 million units in 2010 to 21 million units in 2018. Thus, due to the increase in the demand for vehicles, the demand for vehicle maintenance services and vehicle servicing has also reached a very wide level. In such a situation, it is clear that there is great growth in the amount and quality of the services that can be provided by an automated web application than the services that could be provided to vehicle owners through the traditional manual system. (Zhou *et al.*, 2020)

Each person is extremely busy with their business in the quickly expanding, fiercely competitive business world and is unable to take a break for even a moment. Customers would really prefer to receive services online and have all of their demands met. These days, the Automobile sector keeps its business records on written papers by handwork. They discovered considerable difficulties performing routine manual labor to handle their everyday chores. faces a number of challenges when performing manual tasks, such as managing records of day-to-day activities, receiving customer bookings, service data, staff details, management level details, and handling booking questions. As was already indicated, when they wanted to find quick services online, they encountered various problems with the outdated system. (Matheeban, 2017)

The way in which problems are addressed, the supervisor's comprehension of the client's complaints, the atmosphere in the customer lounge, and the performance of the vehicle following service all have an impact on the customer's experience. From the time the appointment is set until the customer starts driving the car again after servicing, the customer will begin to review the service. When the expected level of service and the actual level of service received don't match, either contentment or dissatisfaction results. Oliver (1980) noted that satisfaction results from outcomes that exceed expectations, whereas dissatisfaction results from outcomes that fall short of expectations. Therefore, when the service received does not live up to the customer's expectations, discontent sets in. All automaker is aware that customer satisfaction is a crucial battleground for competitive advantage and must do every effort possible to prevent this from happening.(Justus, 2021)

3. Methodology

The automated vehicle maintenance and service system aim to provide better customer service as well as improve the efficiency of the organization by providing appropriate solutions to the vulnerabilities that arise from the manual system. The automated system provides a new website for the company's transactions, the ability to make advance bookings for service delivery, the availability of customer vehicle maintenance, replacement of new parts, pricing, and service information as a document. Includes a range of services such as reminding customers via email about upcoming service seasons, advertising business promotional details, posting feedback, maintaining customer profiles, and making online payments.

Both quantitative and qualitative approaches are used to effectively determine the procedures and convey the requirements of System users. The main goal of data collection is to find information about vehicle owners and service station offices. The majority of knowledge is obtained through structured and unstructured interviews with subject matter experts by resolving the issue and finding pertinent documents using the documents analysis method. the problem was solved by examining the technologies, applications, and problems of applying knowledge management. Interviewing leading automobile service management officers and vehicle owners in the Colombo district allowed for the collection of all pertinent information, including all of the specifics and specifications. The objectives were developed following a thorough analysis of the applications of the automation vehicle service Management System's structure, flaws, and issues. This made it easier to develop a framework for analyzing effective automobile service management. evaluated academic publications on pertinent topics in this field. A Google Form with the necessary information was circulated to collect current issues and requirements. As primary data sources, existing automotive service management systems research papers, case studies, service reports, and the internet were all used.

The following diagram shows the conceptual model of the automated web-based car service Management System.
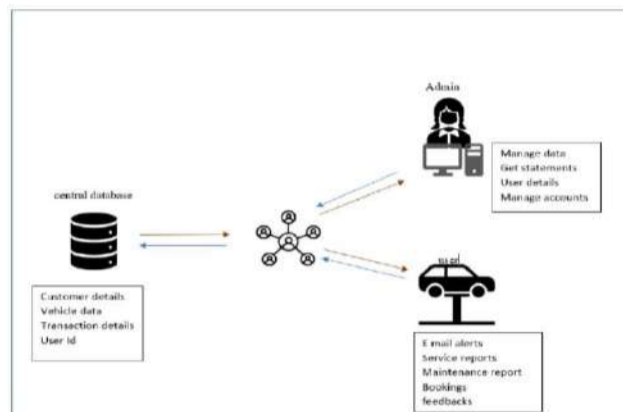

Figure 1. Conceptual model

As demonstrated in the figure the proposed system provides assistance for the service management officers, administration, and people who own the vehicles. admin will be able to manage all the services even including the stocks of materials in an efficient way. At the point when users want to make a reservation for servicing their vehicles, they can register their vehicles throughout the system and after logging in that enables them to book a slot for their service needs. After making reservations, the admin is able to see the booking details in the admin dashboard. All the bookings and service details and transactions will be stored in the database. As technologies that have been used for the proposed system are C#,.NET Framework, JavaScript, HTML, Bootstrap, MySQL, AJAX, and JSON.

4. Results & Discussion

Based on the interviews, field trips, and questions that have been conducted, the need for a fully automated automobile car service management system instead of the existing manual system as a solution to the problems that arose during vehicle servicing has been seen as very important. Finally, these analyses determined the key characteristics that may be implemented in an automated car service management system.

The system maintains two separate dashboards named admin and user. This system is undoubtedly a web-based system, that any vehicle maintenance and service provider can use to make their services more effective and efficient. Vehicle owners can experience the services as per their choice after registering their vehicles through the website. Among those services, many facilities can be provided such as booking appointments online, paying money, getting information, getting old service reports, taking details of previous payments, gain discounts. It also enables administrators to separately study online bookings, cash payments, transaction events, stock updates, and various service reports as well as customer transactions that occur during the day.

A. Registration Module

Vehicle owners have the ability to register in the system by themselves and the admin also has the ability to do user registration.

Figure 2. Registration Module

B. Login Module

To enter the system, users should use the login feature. Users and administrators should provide their username and password to log in to the system.

Figure 3. Login Module

C. Online Booking

When making a reservation for vehicle services, the owner should select the date and time first.

Figure 4. Online Booking

Then users can book the service by selecting the required services and paying the related fees online.
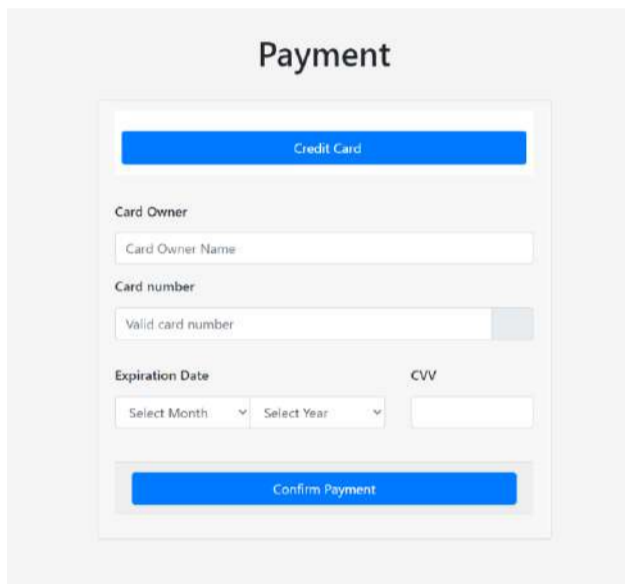

Figure 5. Select Service

Figure 6. Payment

D. Inventory Managing

The availability of the raw materials required to perform the services and their re-order quantities and prices can be viewed through this system at any time required by the administration.
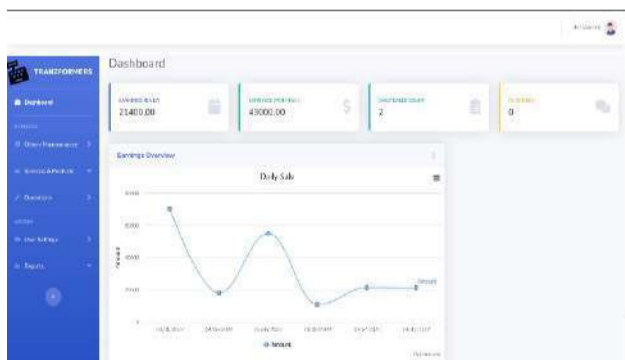

Figure 7. Inventory Managing

E. Reporting Module

Customers, as well as administrators, can get information like reports about the transactions done, services received, information about the services and consumptions done so far, customer information, etc.

Figure 8. Reporting Module

F. Feedback and messaging

The users can send messages to contact the administration and feedback can be used to inform the admin about the effectiveness and weaknesses of the services received.
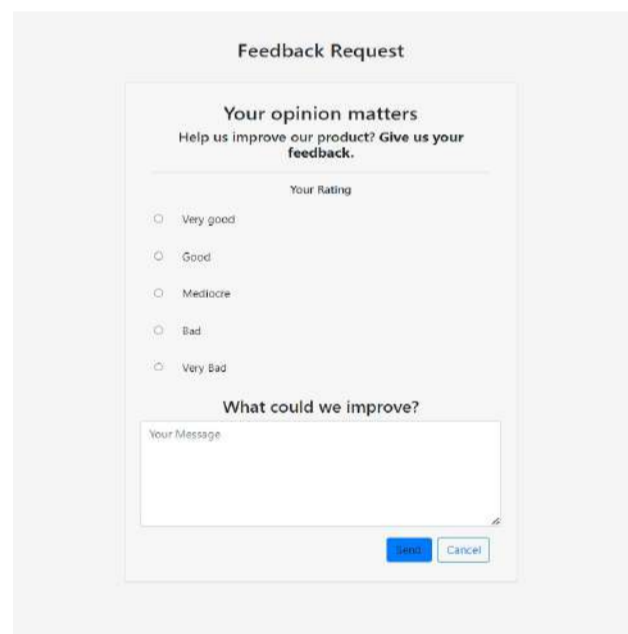

Figure 9. Feed back

G. Slot View

Through this system, the administration officer can clearly understand the amount of service currently received and the service capacity that can be provided further by checking the service slots allocated.

Figure 10. Slot View

The system generates vital resources for the administration as well as the users. With the help of this system, the administration may accurately deliver services to customers in the sector without wasting time on paper documentation.

5. Conclusion

The need to provide services without traffic jams is a problem for many car service providers. There were many service stations for that, but doubts have been raised about the efficiency of the services provided by them. Nowadays, it is seen that a lot of time and effort, as well as money, is spent going to get the vehicles serviced. Due to having to wait in long queues, it is also seen that vehicle owners are reluctant to get their vehicles serviced. Although there are many leading vehicle service centers in Sri Lanka, most of them still provide services to clients using traditional manual systems. This has resulted in many clients not getting the right information and services they need without delay. As a solution to this, this research discusses how an automated web-based system can make the provision of vehicle services efficient. As a solution to the current major problems, using this automated car service management system will save customers time, money, trust, and efficiency by providing the right information in the right way and by automating the booking and paying process online.

References

Matheeban, T. (2017) "Web based Vehicle Service Management System For Trinco Automobile."

S. B. Hanamant, B. Dharmendra and P. Yash (2018) "Online Management System for Automobile Services," *International Journal of Engineering Science and Computing*, 8(2), pp. 16071–16073. Available at: http://ijesc.org/.

Vigyani Singh, S.S.P.K.N.P. (2021) "IRJET- Vehicle Service System," *Irjet*, 8(6), pp. 430–436.

Zhou, F. *et al.* (2020) "Examining the impact of car-sharing on private vehicle ownership," *Transportation Research Part A: Policy and Practice*, 138(June), pp. 322–341. Available at: https://doi.org/10.1016/j.tra.2020.06.003.

Justus, T.F.S. (2021) "Consumer Dissatisfaction in Service Encounter at Car Service Centers -A Scale Development Approach Consumer Dissatisfaction in Service Encounter at Car Service Centers – A Scale Development Approach," (August).

Author Biography

GMIP Aponsu is a 4th-year undergraduate student of the Information Technology department at General Sir John Kotelawala Defence University. He actively created this research Car service management System.

Mr. WAAM Wanniarachchi is a Lecturer (Probationary) in the Department of Information Technology at General Sir John Kotelawala Defence University. He is interested in the field of research in Machine learning and Education.

Mr. GIF de Silva is a Lecturer (Probationary) in the Department of Information Technology at General Sir John Kotelawala Defence University He is interested in the field of research in Software Quality Assurance, Software Engineering Best Practices, Computer Gaming and Psychology, Software Project Management